Environment Canada Environnement Canada

Canada

SWOT Hydrology for Canada

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Water Survey of Canada, Environment Canada

Canadian Hydrology SDT Team
Dr. Vincent Fortin, Atmospheric Research, Environment Canada

Dr. Daqing Yang, Water Research, Environment Canada

Dr. Jay Sagin, University of Saskatchewan

Background

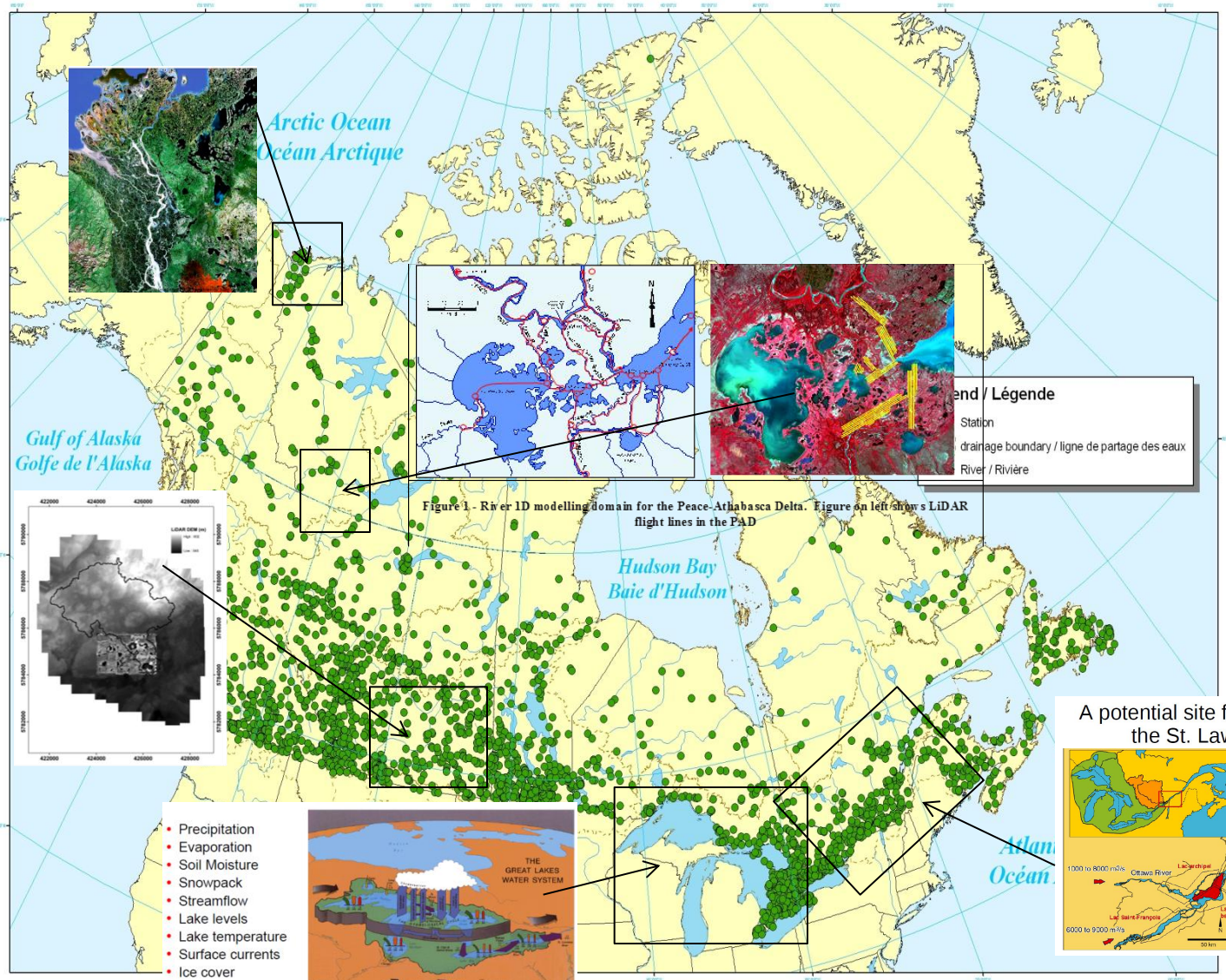
- Canadian SWOT team formed about 1 year ago
- CSA submitting for federal funding
- Led by Environment Canada
  - Science Team focused on site-specific applications
  - Include many University partners
    - University of Saskatchewan
    - University of Sherbrooke
    - University of Waterloo
    - University of Lethbridge
  - Canada Centre for Remote Sensing

Science Plan

- SWOT and potential AirSWOT hydrology applications for Canada are focused on enhanced understanding of water cycle dynamics across Canada. As such, we see two main areas of strong potential applications
- Water Elevation of Storage Features
  - Elevation of large lakes and reservoirs.
  - Elevation (extent and volume) estimation in small lakes, delta lakes and prairie potholes.
  - Flow estimation (change in elevation and local hydraulics)
- using data assimilation in braided rivers and larger delta environments
  - Flow estimation in large rivers
  - Point estimation of flow
- Ancillary objectives may include other changing topographical features
  - Snow depth for large regions of Canada, particularly relevant in sparsely vegetated areas and over marine and freshwater ice
  - Changes in glacier height
  - Arctic ice monitoring

Principle Investigator	Affiliation	Interest/Location
Dr. Alain Pietroniro, P. Eng	Environment Canada Water Survey of Canada	Hydrometric Monitoring Stations, PAD
Co-Investigators		
Dr. Vincent Fortin and Dr. Stephane Bélair	Environment Canada Atmospheric Research Division	Great Lakes, St. Lawrence River, Data Assimilation
M. Jean-François Cantin, Ing.	Environment Canada Water Survey of Canada	Great Lakes, St. Lawrence River
Dr. Philip Marsh	Environment Canada Water Research Division	Mackenzie Delta
Dr. Daqing Yang	Environment Canada Water Research Division	Mackenzie Delta
Dr. Anne Walker	Climate Research Environment Canada	Snow and Ice
Dr. Paul Pestieau	Canadian Ice Centre	Snow and Ice
Dr. John Pomeroy Dr. Kevin Shook, P.Eng	University of Saskatchewan	Prairie Potholes
Dr. Robert Leconte	University of Sherbrooke	St. Lawrence River and PAD
Dr. Claude Duguay	University of Waterloo	Shallow lakes of the Hudson Bay Lowlands
Dr. Chris Hopkinson	University of Lethbridge	PAD
Dr. Brian Brisco	Canada Centre for Remote Sensing	Algorithm Development

National Hydrometric Program
Programme national de relevés hydrométriques



PROVINCE or TERRITORY PROVINCE ou TERRITOIRE	Number of Active Stations ** Numéro de stations en activité **
Alberta	463
British Columbia / Colombie-Britannique	450
Manitoba	290
New Brunswick / Nouveau Brunswick	55
Newfoundland and Labrador / Terre-Neuve-et-Labrador	99
Nova Scotia / Nouvelle-Écosse	29
Nunavut	36
	88
	571
	10
	215
	281
	50
	2637

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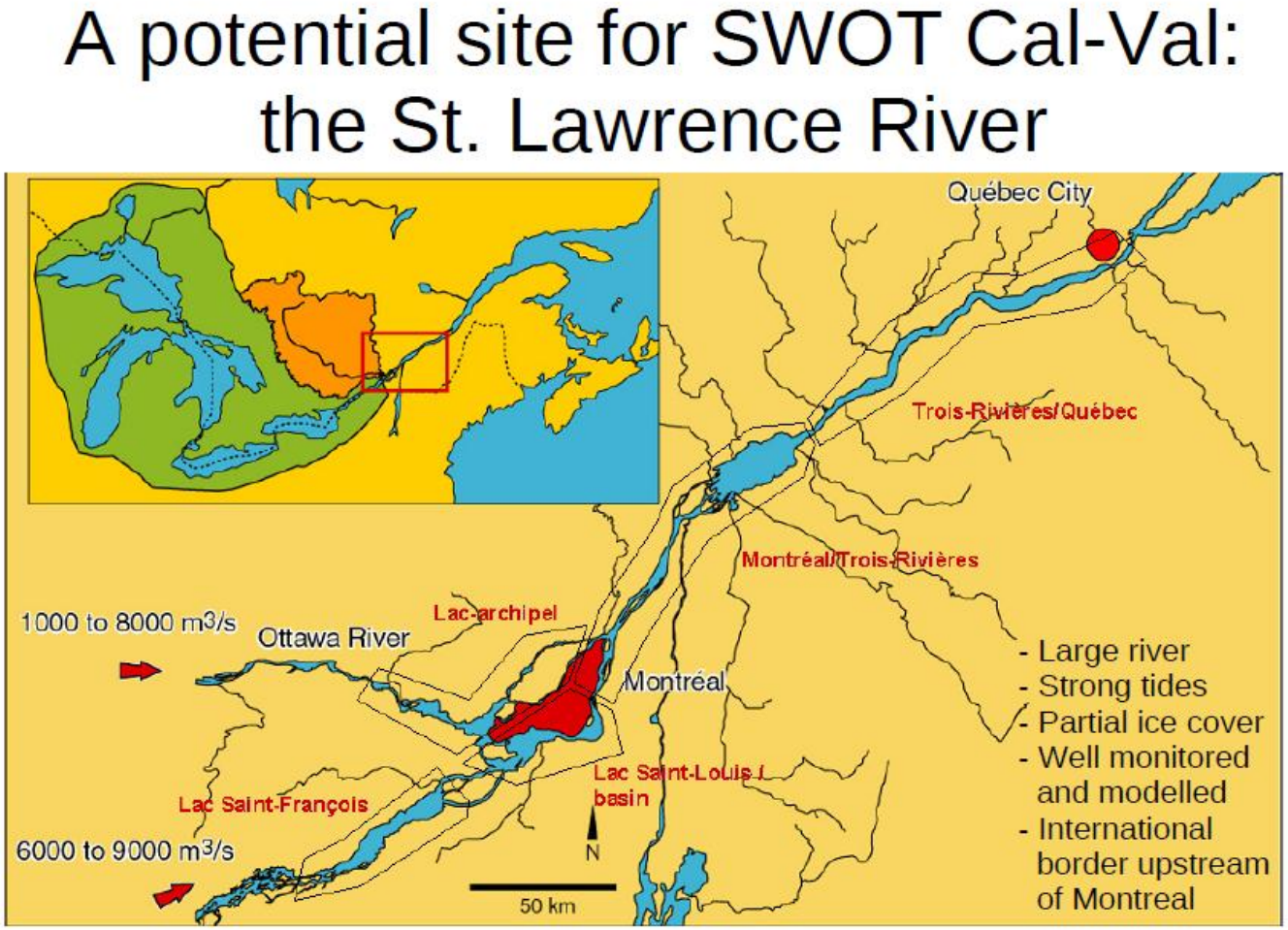
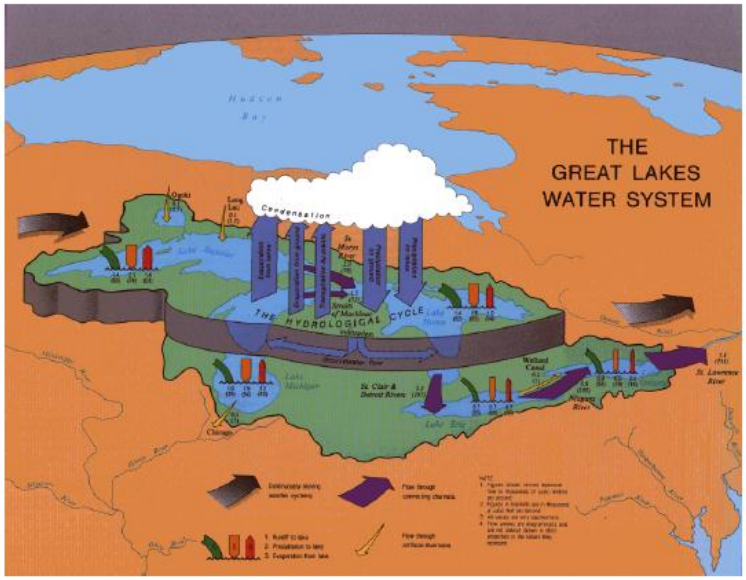
Calibration/Validation of a 2D hydrodynamic Model



Large Lakes – Great Lakes

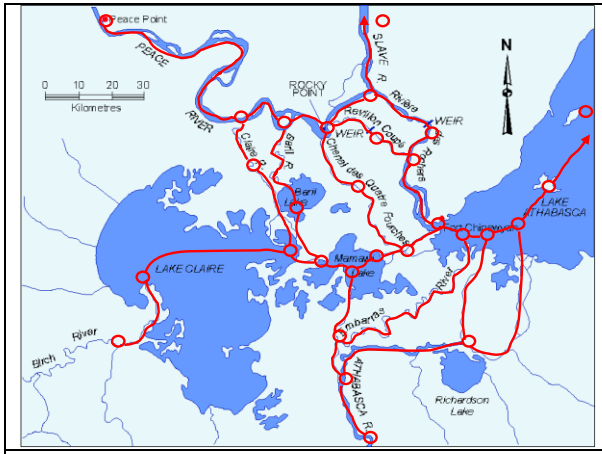
- Precipitation
- Evaporation
- Soil Moisture
- Snowpack
- Streamflow
- Lake levels
- Lake temperature
- Surface currents
- Ice cover



- Shared Responsibility between US and Canada for managing the Water Levels
- NEMO being applied to Great Lakes
- Ungauged inflows large uncertainty
- Lake Levels key indicator

Deltas and Braided Rivers

200 km



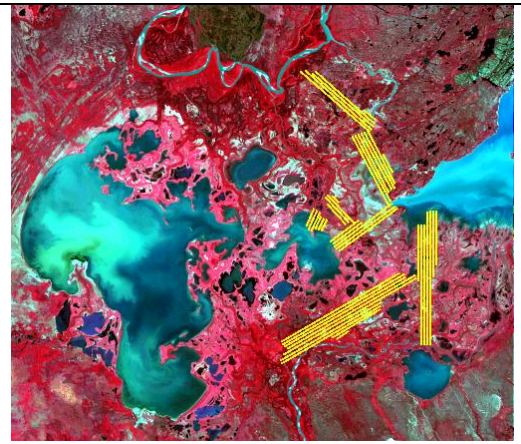
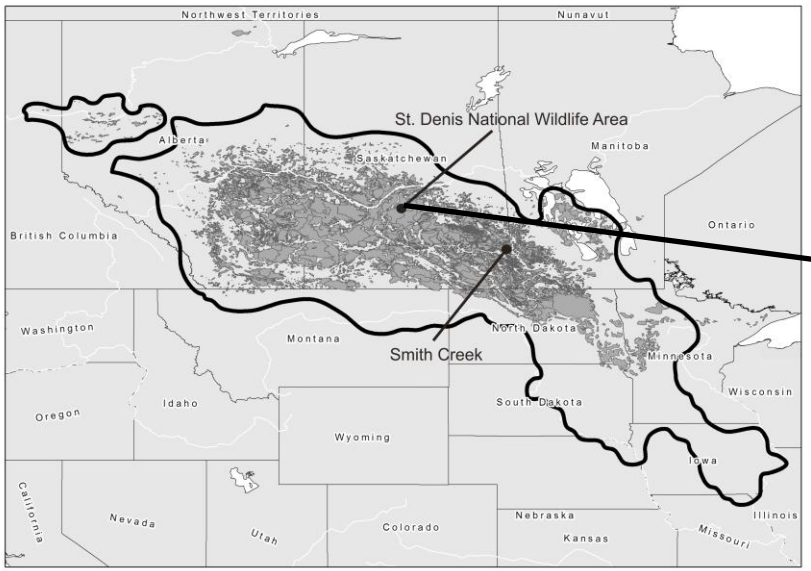


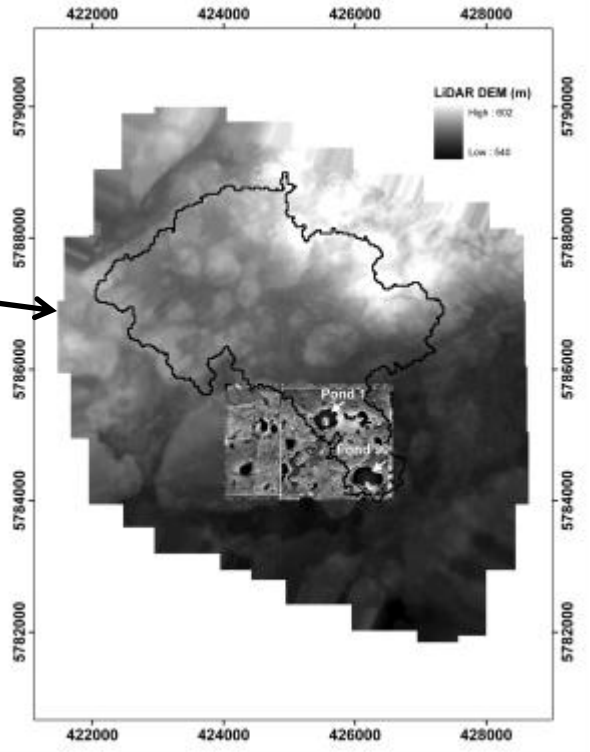
Figure 1 - River 1D modelling domain for the Peace-Athabasca Delta. Figure on left shows LiDAR flight lines in the PAD

Limited gauging : water level only

Existing 1-D hydro-dynamic models well calibrated in Mackenzie and Peace - Athabasca Delta

Prairie Potholes and Shield





NO systematic measurements

Summary

- Canadian Hydrology SWOT Team has submitted a proposed project plan to the Canadian Space agency for possible funding
  - Ancillary funding for university may be sought through the National Science and Engineering Council.
- Potential Sites have been identified
  - We will work with SWOT SDT internationally to see what may be possible for AirSWOT
  - Developing internal expertise for SWOT simulators
  - Expectation is research program will begin spring 2014.